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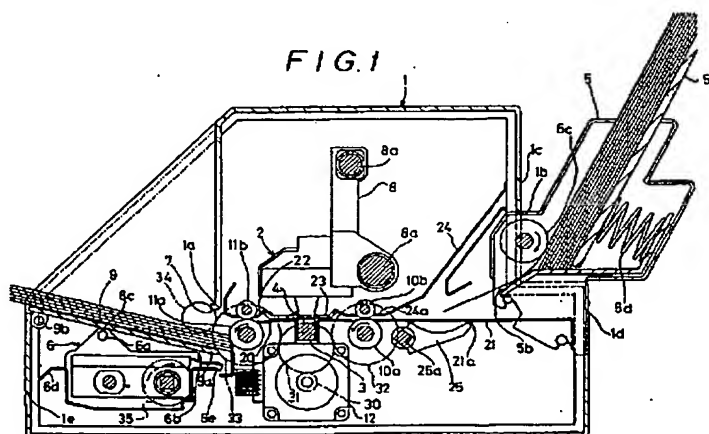
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(54) **Printer.**

(57) A printer having a cut sheet feeder 5 which automatically feeds paper into a printing portion 4, an opening for cut paper 7 and a tractor 8 which feeds continuous paper to the printing portion to selectively use automatically-fed cut paper, manually-fed cut paper and continuous paper for printing. The printer has a paper receiving tray (manually-fed paper guide plate) 9 which can form the opening portion 7 between itself and a part 1a of the printer housing 1. The paper receiving tray is movable between a manual paper-feeding position which it forms the opening portion 7 and during manual

paper-feeding guides printed cut paper into the opening portion, an automatic paper-feeding position which forms the opening portion 7 and during automatic paper-feeding receives printed cut paper, and a closed position to close off the opening 7. The tractor 6 is movable between a first position in which it moves the paper receiving tray 9 into the manual paper-feeding position, a second position to move the paper receiving tray 9 into the automatic paper-feeding position and a third position to move the paper receiving tray 9 into the closed position.

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This invention relates to a printer capable of selectively using cut paper fed manually and/or cut paper fed automatically and continuous paper for printing.

Hitherto, as printers of this kind, types having the following constructions have been known:

(1) those having an opening portion for cut paper for manually feeding sheets of cut paper into a printing portion between a printing head and a platen inside the printer and having continuous paper feeding means for feeding continuous paper such as fan hold paper into the printing portion and constructed so as to selectively use cut paper fed manually and continuous paper for printing;

(2) those having a cut sheet feeder for automatically feeding sheets of cut paper into a printing portion between a printing head and a platen inside the printer and having continuous paper feeding means for feeding continuous paper to the printing part and constructed so as to selectively use cut paper fed automatically by the cut sheet feeder and continuous paper for printing; and

(3) those having a cut sheet feeder for automatically feeding sheets of cut paper into a printing portion between a printing head and a platen inside the printer and an opening portion for cut paper which serves as a manual paper-feeding opening for manually feeding cut paper into the printing portion and also serves as a paper discharge opening for discharging printed cut paper to the outside during automatic paper-feeding, and having continuous paper feeding means for feeding continuous paper to the printing portion and constructed so as to selectively use cut paper, fed automatically by the cut sheet feeder, cut paper fed manually and continuous paper for printing.

However, in all the above conventional printers (1) to (3), because the opening portion for cut paper is always open, and more specifically because the opening portion for cut paper is open even when continuous paper is being used, there has been such a problem that during printing using continuous paper, noise produced inside the printer leaks out to the outside through the opening portion for cut paper.

It is the objective of the present invention, to provide a printer, capable of using continuous paper and cut paper in which the noise generation is reduced.

This object is solved by a printer according to the subject matter of claim 1.

To achieve the above-mentioned object, according to a first embodiment of the present invention, there is provided a printer having an opening portion for cut paper for manually feeding sheets of

cut paper into a printing portion between a printing head and a platen inside the printer and having continuous paper feeding means for feeding continuous paper into the printing portion to selectively use manually-fed cut paper and continuous paper for printing, characterized in that: the printer has a manually-fed paper guide plate which during manual paper-feeding guides the cut paper into the opening portion and can form the opening portion between itself and a portion of the printer housing; the guide plate is mounted on the printer housing movably between a distant position in which it is distant from said part of the printer housing and forms the opening portion and a closed position where it abuts with said part of the printer housing and closes the opening portion; and the continuous paper feeding means engages with the guide plate and is mounted movably between a first position where the guide plate is moved into the distant position and a second position where the guide plate is moved into the closed position.

Further, according to a second embodiment of the present invention, there is provided a printer having a cut sheet feeder which automatically feeds sheets of cut paper into a printing portion between a printing head and a platen inside the printer and having continuous paper feeding means for feeding continuous paper into the printing part to selectively use cut paper fed automatically by the cut sheet feeder and continuous paper for printing, characterized in that: the printer has an opening portion for cut paper through which printed cut paper which has been automatically fed-in by the cut sheet feeder and printed upon in the printing part is discharged to the outside; the printer has a paper receiving tray which receives cut paper discharged through the opening portion and can form the opening portion between itself and a part of the printer housing; the paper receiving tray is mounted on the printer housing movably between a distant position where it is distant from said part of the printer housing and forms the opening portion and a closed position where it abuts with said part of the printer housing and closes the opening portion; and the continuous paper feeding means engages with the paper receiving tray and is mounted movably between a first position where the paper receiving tray is moved into the distant position and a second position where the paper receiving tray is moved into the closed position.

Still further, according to a third embodiment of the present invention, there is provided a printer having a cut sheet feeder for automatically feeding sheets of cut paper into a printing section between a printing head and a platen inside the printer and having an opening portion for cut paper which serves as a manual paper-feeding opening for

manually feeding cut paper into the printing portion and also serves as a paper discharge opening for discharging printed cut paper to the outside during automatic paper-feeding and having continuous paper feeding means for feeding continuous paper into the printing part to selectively use cut paper fed automatically by the cut sheet feeder, cut paper fed manually and continuous paper for printing, characterized in that: the printer has a paper receiving tray which during manual paper-feeding becomes a guide member which guides cut paper into the opening portion and during automatic paper-feeding becomes a tray which receives printed cut paper, and which can form the opening portion between itself and a part of the printer housing; the paper receiving tray is mounted on the printer housing movably between a manual paper-feeding position in which it is distant from said part of the printer housing and forms the opening portion and during manual paper-feeding guides cut paper into the opening portion, an automatic paper-feeding position which is distant from said part of the printer housing and forms the opening portion and during automatic paper-feeding receives printed cut paper, and a closed position which abuts with said part of the printer housing and closes the opening portion; and the continuous paper feeding means engages with the paper receiving tray and is mounted movably between a first position where the paper receiving tray is moved into the manual paper-feeding position and a second position where the paper receiving tray is moved into the automatic paper-feeding position and a third position where the paper receiving tray is moved into the closed position.

According to the first embodiment of the present invention, when the continuous paper feeding means moves into the first position this feeding means engages with the manually-fed paper guide plate and moves this guide plate into the distant position and as a result of this the guide plate moves away from said part of the printer housing and the opening portion for cut paper is formed, and when the continuous paper feeding means moves into the second position this feeding means engages with the manually-fed paper guide plate and moves this guide plate into the closed position and as a result the guide plate abuts with said part of the printer housing and the opening portion for cut paper is closed.

According to the second embodiment of the present invention, when the continuous paper feeding means moves into the first position, this feeding means moves the paper receiving tray into the distant position and as a result the paper receiving tray moves away from said part of the printer housing and the opening portion for cut paper is formed, and when the continuous paper feeding

means moves into the second position this continuous feeding means moves the paper receiving tray into the closed position and as a result the paper receiving tray abuts with said part of the printer housing and the opening portion for cut paper is closed.

According to the third embodiment of the present invention, when the continuous paper feeding means moves into the first position this feeding means moves the paper receiving tray into the manual paper-feeding position and as a result the paper receiving tray moves away from said part of the printer housing and the opening portion for cut paper which serves as a manual paper feeding opening portion is formed and the paper receiving tray can guide manually-fed cut paper into the opening portion, and when the continuous paper feeding means moves into the second position this feeding means moves the paper receiving tray into the automatic paper-feeding position and as a result the paper receiving tray moves away from the part of the printer housing and the opening portion for cut paper which serves as a paper discharge opening is formed and the paper receiving tray can receive automatically-fed printed cut paper, and when the continuous paper feeding means moves into the third position this feeding means engages with the paper receiving tray and moves this tray into the closed position and as a result the paper receiving tray abuts with said part of the printer housing and the opening portion for cut paper is closed.

An embodiment of the invention will be described with reference to drawings, in which shows:

Figure 1, a cross-sectional view illustrating a printer according to an embodiment of the invention,

Figure 2, a cross-sectional view similar to that of Figure 1, illustrating a state in which cut paper fed manually is used,

Figure 3, a cross-sectional view similar to that of Figure 1, illustrating a state in which continuous paper is used.

Fig. 1 illustrates a printer according an embodiment of the present invention. As shown in Fig. 1, this printer has a printer housing 1, a cut sheet feeder 5 which automatically feeds cut paper into a printing portion 4 between a printing head 2 and a platen 3 inside the printer, a tractor (continuous paper feeding means) 6 which feeds and hold paper (hereinafter referred to simply as "continuous paper") having ear portions provided with a row of feed holes along both sides into the printing portion 4, and an opening portion for cut paper 7 which serves as a manual paper-feeding opening for manually feeding cut paper into the printing portion 4 and also serves as a paper discharge opening for discharging printed cut paper to the outside during

automatic paper feeding, and the printer is capable of printing using cut paper automatically fed by the cut sheet feeder 5, cut paper fed manually and continuous paper selectively.

The printing head 2 is mounted on a carriage 8 and guided by carriage guides 8a together with the carriage 8 so as to move back and forth in a direction perpendicular to the surface of the paper of Fig. 1.

The printer also has a paper receiving tray (manual-feeding paper guide plate) 9 which during manual paper feeding becomes a guide member for guiding cut paper into the opening portion for cut paper 7 and during automatic feeding becomes a tray for receiving printed cut paper. This paper receiving tray 9 can form the opening portion 7 between its end portion 9a and a part 1a of the printer housing 1.

The paper receiving tray 9 is pivotally mounted on the printer housing 1 by means of a supporting shaft 9b. The paper receiving tray 9 is pivotable between a manual paper-feeding position (the position shown in Fig. 2) where its end portion 9a is distant from the part 1a of the printer housing 1 and forms an opening portion for cut paper 7 which serves as a manual paper-feeding opening and during manual paper-feeding guides cut paper into the opening portion 7, an automatic paper-feeding position (the position shown in Fig. 1) where its end portion 9a is distant from the part 1a and forms an opening portion for cut paper 7 which serves as the paper discharge opening and during automatic paper-feeding receives printed cut paper, and a closed position (the position shown in Fig. 3) in which its end portion 9a abuts with the part 1a and closes the opening portion for cut paper 7.

The cut sheet feeder 5 is, as shown in Fig. 1, removably mounted on an installation portion 1b of the printer housing 1. On this cut sheet feeder 5 there are mounted a hopper plate 5a onto which cut paper is loaded, a picking roller 5c which is disposed inside the cut sheet feeder 5 and which sends out cut paper that has been loaded onto the hopper plate 5a downward and through a feeder exit 5b into the printer one sheet at a time, and a coil spring 5d which urges the hopper plate 5a toward the picking roller 5c side. During manual paper-feeding, as shown in Fig. 2, and when continuous paper is being used, as shown in Fig. 3, when the cut sheet feeder 5 has been removed from the installation portion 1b of the printer housing 1, the installation portion 1b is covered with a cover not shown, which can be fitted to the printer housing 1.

Inside of the printer housing 1, as shown in Fig. 1, there are mounted a pair of paper feed rollers 10a, 10b which during automatic paper-feeding feed cut paper sent by the picking roller 5c into the

printing portion 4 between the printing head 2 and the platen 3, a pair of paper discharge rollers 11a, 11b which during automatic paper-feeding discharge printed cut paper which has been printed upon in the printing portion 4 out onto the paper receiving tray 9, and a paper feed motor 12.

Inside of the printer housing 1, as shown in Fig. 1, there are also mounted left and right horizontal guide plates 20 and 21 located on both sides of the platen 3, a guide plate 22 which together with the left-side guide plate 20 guides cut paper and continuous paper in the vicinity of the pair of paper discharge rollers 11a and 11b, a guide plate 23 which together with the left and right horizontal guide plates 20, 21 guides cut paper and continuous paper in the vicinity of the printing portion 4, a guide portion 24a which together with the right-side guide plate 21 guides cut paper and continuous paper in the vicinity of the pair of paper feed rollers 10a, 10b, and a guide member 24 which guides printed continuous paper diagonally upward toward a first continuous paper discharge slot 1c in the printer housing 1.

A paper switching claw 25, pivotally supported by means of a supporting shaft 25a, is disposed beneath the right-side horizontal guide plate 21. This paper switching claw 25 is pivotable between a first switchover position in which a portion of the claw 25 projects upward through an opening 21a in the right-side horizontal guide plate 21 and causes printed continuous paper sent toward the right of Fig. 1 by the pair of paper feed rollers 10a and 10b to be discharged toward the guide member 24 side and out through the first paper discharge opening 1c, and a second switchover position in which it does not project upward from the opening 21a and allows the printed continuous paper to move toward a second continuous paper discharge opening 1d in the printer housing 1.

The tractor 6 is, as shown in Fig. 1, pivotally mounted on the printer housing 1 by means of a supporting shaft 6a. This tractor 6 is pivotable between a first position (the position shown in Fig. 2) in which its upper end portion 6b engages with the underside of the paper receiving tray 9 and moves the paper receiving tray 9 into the manual paper-feeding position mentioned above, a second position (the position shown in Fig. 1) in which its upper portion 6c engages with the underside of the paper receiving tray 9 and moves the paper receiving tray 9 into the automatic paper-feeding position mentioned above, and a third position (the position shown in Fig. 3) where the upper end portion 6b engages with the underside of the paper receiving tray 9 and moves the paper receiving tray 9 into the closed position mentioned above.

In the tractor 6 there are mounted rotary claws, not shown, which engage with the feed holes at the

edges of the continuous paper and send the continuous paper in the rightward direction of Fig. 3, an entrance guide portion 6d which guides continuous paper inserted through a continuous paper supply slot 1e in the printer housing 1 (or loaded inside the printer) to the rotary claws, and an exit guide portion 6e which guides continuous paper sent by the rotary claws toward the pair of paper discharge rollers 11a, 11b. When the tractor 6 is placed in the third position mentioned above, the end of the exit guide portion 6e is directed between the paper discharge rollers 11a and 11b (refer to Fig. 3).

The picking roller 5c, during automatic paper-feeding, is rotated in the direction of the arrow in Fig. 1 by a driving force from the paper feed motor 12 (or a separate motor). The rotation of the paper feed motor 12 is transmitted through a motor pinion gear 30 and an intermediate gear 31 to a gear 32 integral with the paper feed roller 10a and a gear 33 integral with the paper discharge roller 11a. The rotation of the paper feed motor 12 is also transmitted to the rotary claws, through the motor pinion gear 30, the intermediate gear 31, the gear 33, an intermediate gear 34 which meshes with this gear 33 and a gear 35 integral with the rotary claws which meshes with the intermediate gear 34 only when the tractor 6 is in the above-mentioned third position shown in Fig. 3.

The paper feed motor 12 is controlled by an electronic control section not shown, such that during automatic paper-feeding, shown in Fig. 1, it rotates the picking roller 5c, the paper feed roller 10a and the paper discharge roller 11a in the directions shown respectively by the arrows in Fig. 1, and when continuous paper is being used, as shown in Fig. 3, it rotates the gear 35 integral with the rotary claws, the paper discharge roller 11a and the paper feed roller 10a respectively in the directions shown by the arrows in Fig. 3. During manual paper-feeding, shown in Fig. 2, the paper feed motor is controlled by the electronic control section such that it rotates the paper discharge roller 11a and the paper feed roller 10a in the directions shown by the arrows in Fig. 2 until printing of the cut paper is completed, and then after printing is completed it rotates the rollers 10a and 11a in the reverse direction.

The tractor 6 is pivoted automatically or manually between the three positions mentioned above based on the push-operation of operating buttons, for example operating buttons for selecting manual paper-feeding, automatic paper-feeding, and continuous paper, mounted on an operating panel not shown. The switchover claw 25 also is automatically or manually pivoted between the two positions mentioned above.

Next, the operation of the embodiment having the above construction will be explained.

When the tractor 6 moves into the first position, shown in Fig. 2, the upper portion 6c of the tractor 6 engages with the underside of the paper receiving tray 9 and moves the paper receiving tray 9 into the manual paper-feeding position shown in Fig. 2. As a result, the end portion 9a of the paper receiving tray 9 moves away from the part 1a of the printer housing 1 and an opening portion for cut paper 7 which serves as the manual paper-feeding opening is formed, and it becomes possible for the paper receiving tray 9 to guide manually-fed cut paper into the opening portion 7. In this state, when cut paper is placed on the paper receiving tray 9 and manually fed, this cut paper passes through the opening 7, is sent in the rightward direction of Fig. 1 by the paper discharge rollers 11a, 11b and the paper feed rollers 10a, 10b rolling in the direction of the arrows of Fig. 1, is printed upon in the printing portion 4, and after printing is completed, is sent in the leftward direction of Fig. 1 by the paper discharge rollers 11a, 11b and the paper feed rollers 10a, 10b rolling in the reverse direction and discharged through the opening 7 onto the paper receiving tray 9.

With the cut sheet feeder 5 installed on the printer housing 1, when the tractor 6 moves into the second position shown in Fig. 2, the upper end portion 6b of the tractor 6 engages with the underside of the paper receiving tray 9 and moves the paper receiving tray 9 into the automatic paper-feeding position shown in Fig. 1. As a result, the end portion 9a of the paper receiving tray 9 moves away from the part 1a of the printer housing 1 and the opening portion for cut paper 7 which serves as the paper discharge opening is formed and it becomes possible for the paper receiving tray 9 to receive printed cut paper. In this state, when an operating button for starting printing, not shown in the drawings, is operated, cut paper loaded in the cut sheet feeder 5 is extracted one sheet at a time by the picking roller 5c and this extracted cut paper is sent by the paper feed rollers 10a, 10b to the printing portion 4 and is printed upon, and the printed cut paper is sent out by the paper discharge rollers 11a, 11b and discharged through the opening portion 7 onto the paper receiving tray 9.

With the cut sheet feeder 5 removed from the installation portion 1b of the printer housing 1 and the cover, not shown in the drawings, fitted onto the printer housing 1 and covering the installation portion 1b, when the tractor 6 moves into the position 3 shown in Fig. 3 the upper end portion 6b of the tractor 6 engages with the underside of the paper receiving tray 9 and moves the paper receiving tray 9 into the closed position shown in Fig. 3. As a result, the end portion 9a of the paper receiv-

ing tray 9 is caused to abut with the part 1a of the printer housing 1 and the opening portion for cut paper 7 is closed off.

In this state, when the operating button, not shown in the drawings, for starting printing is operated, printing of continuous paper is carried out with the opening portion 7 closed. Consequently, during printing using the continuous paper, noise produced inside the printer does not leak out to the outside through the opening portion 7, and during this printing there is less leakage of noise produced inside the printer to the outside.

It is noted that although in the above embodiment the paper receiving tray 9 is supported on the printer housing 1 by means of the supporting shaft 9b so as to pivot between the above-mentioned three positions, the printer may alternatively be constructed in such a way that the paper receiving tray 9 is mounted vertically movably on the printer housing 1 and the paper receiving tray 9 moves between the three positions by this vertical movement.

Also, although in the above embodiment the tractor 6 is supported on the printer housing 1 by means of the supporting shaft 6a so as to pivot between the above-mentioned three positions, the printer may alternatively be constructed in such a way that the tractor 6 is mounted vertically or horizontally movably on the printer housing 1 and the tractor 6 moves between the three positions by this vertical or horizontal movement.

As described in detail above, according to the first embodiment of the present invention, when the continuous paper feeding means moves into the first position this feeding means engages with the manually-fed paper guide plate and moves this guide plate into the distant position and as a result of this the guide plate moves away from the part of the printer case and the opening portion for cut paper is formed, and when the continuous paper feeding means moves into the second position this feeding means engages with the manually-fed paper guide plate and moves this guide plate into the closed position and as a result the guide plate abuts with the part of the printer and the opening portion for cut paper is closed.

According to the second embodiment of the present invention, when the continuous paper feeding means moves into the second position this feeding means moves the paper receiving tray into the closed position and as a result the paper receiving tray abuts with the part of the printer case and the opening portion for cut paper is closed.

According to the third embodiment of the present invention, when the continuous paper feeding means moves into the third position this feeding means engages with the paper receiving tray and moves this tray into the closed position and as

a result the paper receiving tray abuts with the part of the printer case and the opening for cut paper is closed.

Consequently, the leakage to the outside of noise produced inside the printer during printing using continuous paper can be made low.

Claims

1. A printer capable of selectively using cut paper and continuous paper comprising:
 - a printer casing (1);
 - a printing head (2) and an internal platen (3), arranged inside the printer casing and defining a printing portion (4);
 - a continuous paper feeding means (6), for feeding continuous paper into said printing portion; and
 - a cut paper feeding means for selectively feeding cut paper into said printing portion;**characterised in that**
 - a plate (9) is provided, which is mounted on said casing (1) of said printer moveably between a first position, where it is distant from a part (1a) of said printer casing and forms an opening (7), and a closed position, where it abuts with said part of said printer casing and closes said opening.
2. A printer according to claim 1, **characterised in that** said continuous paper feeding means (6) engages with said plate (9), and is mounted moveably between a first position, at which said plate (9) is held in said first, distant position, and a second position, at which said plate (9) is moved into said closed position.
3. A printer according to claims 1 or 2, **characterised in that** said plate (9) is used as a guide plate, to manually feed cut paper into said printing portion.
4. A printer as claimed in at least one of the preceding claims 1 to 3, **characterised in that** said printer has a cut sheet feeder (5), for automatically feeding sheets of cut paper into said printing portion, and wherein said plate (9) is used as a paper receiving tray, receiving cut paper discharged through said opening (7).
5. A printer according to at least one of the preceding claims 1 to 4, **characterised in that** said plate (9) is moveable in a second open position, for receiving automatically feed cut paper discharged through said opening (7).
6. A printer according to claim 5, **characterised in that** said continuous paper feeding means

is moveable in a third position, by which said plate (9) is moved in said second open position.

7. A printer according to at least one of the preceding claims 1 to 6, **characterised in that** said continuous paper feeding means is a tractor (6), having an upper end portion (6b) which engages the under side of said plate (9).
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8. A printer according to at least one of the preceding claims 1 to 7, **characterised in that** said tractor (6) is pivotably mounted on said printer housing (1) by means of a supporting shaft (6a).
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9. A printer according to at least one of the preceding claims 1 to 8, **characterised in that** a pair of paper feed rollers (10a,10b) are provided within said printer housing (1), which during automatic paper feeding feed cut paper sent by picking rollers (5c) into said printing portion (4) between the printing head (2) and the internal platen (3) and a pair of paper discharge roller (11a, 11b) which during automatic paper-feeding discharge printed cut paper which has been printed upon in the printing portion (4) out of the opening (7) onto the paper receiving tray (9).
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10. A printer according to claim 9, **characterised in that** a paper feed motor is provided, which is connected to said paper discharge rollers (11) and that paper feed rollers (10) and which is controlled by an electronic control section such, that it rotates the paper discharge roller (11) and the paper feed roller (10) in a first direction, during manual cut paper-feeding until printing of the cut paper is completed, and than rotates said rollers (10, 11) in the reverse direction, to discharge said cut paper through said opening (7) on said plate (9).
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